



Authorizations and Permits for Protected Species (APPS)

File #: 19641

Title: Application to conduct scientific research an

Modification: 2

Applicant Information

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Project Information

File Number: 19641

Application Status: **Application Complete - Issued**

Project Title: Application to conduct scientific research and monitoring of Shortnose Sturgeon (*Acipenser brevirostrum*) and Atlantic Sturgeon (*A. oxyrinchus oxyrinchus*) in Connecticut Waters and Long Island Sound.

Project Status: New

Previous Federal or State Permit:

Permit Requested: • ESA Section 10(a)(1)(A) permit (other)

Where will activities occur? US Locations including offshore waters

Research Timeframe: **Start:** 06/20/2016 **End:** 03/31/2027

Sampling Season/Project Duration: Sampling would be conducted during all months of the year in Connecticut waters and in the Connecticut River up to river kilometer 140 on an annual basis, when possible (ice cover, water temperature and dissolved oxygen levels permitting). Sampling could be up to 20 times per month when positive fish collections and available staffing and equipment/resources permit, however, a typical sampling regime will be twice per week from April through October for a monthly total of 8 sampling trips and a maximum of 76 sampling trips per year. Periodic presence-absence studies would also be conducted for shortnose sturgeon in the Thames and Housatonic Rivers. A permit is requested for 10 years.

Abstract:

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A ten-year permit is requested by the CT DEEP to collect, examine and tag shortnose and Atlantic sturgeon in Connecticut waters. Shortnose sturgeon research will be conducted in the Connecticut River (CT River) from the mouth to the Holyoke Dam (river kilometer 140). Monitoring, including presence, abundance, age and sex composition, habitat utilization and seasonal movement, are all vital information necessary to maintain these populations. Monitoring of shortnose sturgeon below the Holyoke Dam is essential in understanding effects of fish passage devices and policies in the CT River and determining long term health of this population segment.

Annual activities would include capturing 300 adult, sub-adult and juvenile shortnose sturgeon and 300 adult, sub-adult and juvenile Atlantic sturgeon. Procedures would include measuring, tissue sampling, PIT tagging, photographing and weighing. A sub-set of sturgeon of both species would have a 1-2 cm length of the secondary pectoral fin ray removed for age determination (Baremore, Rosati 2014; Ruddle 2016), essential to the understanding recruitment to the population and ensuring the long term viability of these stocks. Another sub-set of sturgeon of both species (adults/sub-adults and juveniles), would be anesthetized and surgically implanted with an acoustic transmitters for determining important habitat utilization and seasonal movements annually. Transmitter sizes would vary based on the size of fish selected, but no transmitter would exceed 2% of the body weight of the fish. All transmitters would be pre-coated with 'Silastic' to prevent foreign body rejection by the fish. Standard surgical techniques would be used, and only sturgeon in excellent health would be chosen. Finally, another sub-set of sturgeon of both species (adults/sub-adults and juveniles) would be anesthetized, blood sampled, and gastric lavaged for diet content analysis.

Project Description

Purpose: Purpose: The primary objective of the application is to allow CT DEEP staff to monitor and continue collecting information on Shortnose and Atlantic Sturgeon to ensure the long term viability the two species in CT waters. For purpose of defining life stages of our target species, we define adult Atlantic sturgeon as >1300 mm fork length (FL), sub-adults as 1000-1300 mm FL, and juveniles as <1,000 mm FL. We define adult shortnose sturgeon as >600mm FL, sub-adults as between 450 mm - 600 mm FL, and juveniles as < 450 mm FL.

One objective is to update a population assessment of Shortnose Sturgeon in the Connecticut River and obtain information on Atlantic Sturgeon throughout CT waters. Updated and current information is necessary to provide the best available information used for coastwide stock assessments and in internal CT DEEP environmental review of all structures and dredging applications that come before the Department, as well as understanding stock changes associated with climate change. Previous CT DEEP activities have documented seasonal movement patterns and utilization of discrete habitats. Generalized seasonal movements of both shortnose and Atlantic sturgeon were in accord with environmental conditions and generalized movement patterns. Climate change patterns and atypical riverine conditions in recent years appear to be altering sturgeon movements and further study is needed. Previous CT DEEP efforts also suggest a systematic doubling in numbers of shortnose sturgeon in the lower Connecticut River, from 2,500 in the early 1980s. Additional collection, tagging and recapture information will be utilized with more sophisticated computer models to generate more reliable population estimate of shortnose sturgeon.

Increases in numbers of adult/sub-adult shortnose sturgeon captured in the lower CT river, combined with small juvenile shortnose sturgeon collected, particularly in light of regular dewatering of an upriver spawning location, documents that successful reproduction is taking place in the lower Connecticut River. This information is in contrast to repeated assumptions in the literature of a non-spawning population of shortnose sturgeon in the lower Connecticut River. Collection of small genetically distinct Atlantic sturgeon in the CT River documents a successful spawning event and requires additional study. Efforts focusing on small juvenile Shortnose and Atlantic Sturgeon will characterize annual relative abundance and important habitats for juvenile sturgeon, in the lower 140 kilometers of the Connecticut River.

Description: =====

***Capture:**
A total of 300 hundred adult/sub-adult and juvenile size classes of each Atlantic sturgeon (Take Table; Lines 1-8) and shortnose sturgeon (Take Table; Lines 10-18) will be collected with gill nets and trawls. Gillnets utilized will be constructed of multifilament netting in mesh sizes ranging from 4 to 18 cm stretch measure (single mesh size per net, 30.5 m long by 1.8 m deep). Gill nets will be set throughout the main body of the Connecticut River and in Long Island Sound year round. Up to four nets will be set on any given sampling excursion with nets set on the bottom with anchors on both ends for 1.0 to 3.0 hours in water depths from 3.0 to 40.0m. Soak time will be inversely related to water temperature as per NMFS guidelines (Kahn and Mohead 2010, Damnon-Randall et al. 2010). Dissolved oxygen levels will also be monitored and no gill nets will be set if DO levels fall below 4.5 mg/L.

Trawls of various sizes will also be employed throughout the mainstem CT River and in LIS where obstruction free courses are known. Bottom trawls will be towed at approximately 1.5 knots groundspeed against the prevailing current. Small skiff trawls (5cm mesh, 5.5m headrope) will be fished in the mainstem CT River for 5 to 15 minutes from a small outboard powered skiff. Larger trawls (10.2cm mesh, 9.1m headrope) may be fished in LIS as per the typical CT Long Island Sound Trawl Survey (Gottschall et al. 2000).

All sturgeon collected will be individually removed from the gear and placed into a live well in the boat equipped with a flow through water system. Fish will be processed individually in a water filled measuring box (30cm wide x 25cm high x 140cm long), with "Stress Coat" added, for examination, measuring and tagging. All sturgeon are scanned with a PIT tag reader for the presence of one or more tags and all untagged fish will have a PIT tag added as per NMFS recommendation (Moser et al. 2000; Kahn & Mohead 2010). A PIT tag (Biomark TX1411SST 134.2 khZ, 12.5mm x 2.07mm) will be injected under the skin on the left side of the body, immediately anterior to base of the dorsal fin. As per NMFS requirements, a 1 cm² square section of soft fin rays will be removed with surgical scissors for genetic typing and placed into an individually labeled vial filled with 100% Ethanol. Genetic tissue samples will be forwarded to the National Repository in Leetown, West Virginia for future DNA typing. Known recaptures would be excluded from this procedure. There is no known evidence that this procedure harms sturgeon and recapture of shortnose sturgeon have shown re-growth of this tissue in as little as 2 months. Fish would then be placed into a capture sling and suspended from a digital scale for weighing. In normal processing fish and sling are then lowered over the side of the boat, the sling opened and the fish allowed to swim out and back down into the water. The entire examination/processing procedure requires less than a minute per fish.

***General Handling Activities:**

Methods will include measuring length, eye width, mouth width, noting general physical condition, PIT tagging, photographing, weighing and releasing. We will capture, handle and release up to 300 adult, sub-adult and juvenile shortnose sturgeon and 300 adult, sub-adult and juvenile Atlantic sturgeon per year.

***Temporary Holding:**

Sturgeon will be held in boat-side net pens. Total holding time of any one sturgeon will not exceed two hours and processing time of any one sturgeon will not exceed 15 minutes, not including recovery time from anesthesia in the live car or holding tank. Fish receiving surgically-implanted transmitters will be held only until the fish has recovered from anesthesia and/or surgery.

***Telemetry Tagging:**

Subsets of up to 25 adult/sub-adult and 10 juvenile age classes of each Atlantic sturgeon (Take table; Lines 2 & 6) and shortnose sturgeon (Take table; Lines 12 & 16) per year will be selected for telemetry research to assist in determining preferred locations/habitats, rates of movement and timing of seasonal movements. All fish selected will be in good health and will be anesthetized with either electro-narcosis or MS222 at a dose of up to approximately 150mg/l. Sturgeon will be maintained, ventral side of the fish up with water levels manipulated to maintain water over the gills but not flow onto the ventral side/incision site. The incision location, approximately 10cm posterior of the pectoral girdle and just lateral of the midline will be swabbed with 'Betadine' antiseptic. A 2.5cm incision will be made with a sterile scalpel using all possible care to prevent damaging internal organs through lifting the flesh up from the organs with a sterile mall probe. Appropriate sized ultrasonic transmitters (Vemco V9 9mm diameter by 21 mm long, 1.6 g or V13 13mm diameter by 36mm long, 6 g, respectively) previously coated with 'Silastic' material to reduce foreign-body rejection (Summerfelt and Mosier 1984)) will be inserted through the incision and pushed posterior to avoid placing pressure on the wound site. No transmitter implanted will exceed guidelines of more than 2% of the body weight of the fish. The incision will then be closed with non-absorbable sutures in cruciate pattern (Matsche and Bakal 2008). Additional antiseptic solution will be swabbed over the wound site and the fish returned to an upright position and placed into a flow through water system until recovered and active for release. No sturgeon will be held in captivity for more than 30 minutes.

***Aging Fin Ray Sampling (Second Marginal Fin Ray):**

Subsets of up to 25 adult/sub-adult and 25 juvenile age classes of each Atlantic sturgeon (Take table; Lines 3 & 7) and shortnose sturgeon (Take table; Lines 13 & 17) in good overall health will have a 1- 2 cm length of the Second Marginal Fin Ray of the right pectoral fin excised for age determination per year. The second marginal ray will be snipped with cutting tools, separated from the bordering primary and other secondary rays and placed into individually labeled vials. The area where the fin ray is excised will be treated with 'Betadine' antiseptic before being returning the fish to the water. This technique (Barimore & Rosati 2014; and Ruddle 2015) has been shown to be non-deleterious, healing faster and yielding better results than other studies. Re-growth of these tissue also takes place fairly rapidly.

***Diet Studies (Gastric Lavage):**

Each year the stomach contents of up to 5 juvenile Atlantic sturgeon (Take table; Lines 7) and up to 20 adults/sub-adult and 15 juvenile shortnose sturgeon (Take table; Lines 13 & 17) will be sampled for diet analysis throughout the spring, summer, fall and winter using gastric lavage (Collins et al. 2008; Haley 1998; Savoy & Benway 2004). A flexible polyethylene tube having a 2mm outer diameter will be carefully passed through the sturgeon's alimentary canal and verified to be properly positioned in the stomach by feeling the tubing from fish's ventral surface. Gastric lavage will be then be carried out by gently flooding the stomach cavity with water delivered from a pressurized garden sprayer. The fish will then be allowed to recover in aerated holding tanks or floating net pens prior to release. The entire procedure, including anesthetizing, will take from three to eleven minutes (Collins et al. 2008).

***Blood Sampling:**

Results obtained from blood sampling and gastric lavage are complementary procedures in diet analysis and thus these activities would be paired. Additionally, size, condition and recapture history are also often best interpreted with respect to sex of the individual fish, given that males and females may show key differences in these traits. Hence, blood collection in sturgeon would also be used for finding evidence of protein compounds serving as markers for sex determination. Blood would be collected from the caudal veins by inserting a hypodermic needle perpendicular to the ventral midline at a point immediately caudal to the anal fin. The needle would be slowly advanced while applying gentle negative pressure with the syringe until blood freely flows into the syringe. Once a blood sample is collected, direct pressure would be applied to the site of to ensure clotting and prevent further blood loss (Stoskopf 1993). Blood samples will be obtained using a sterile 3-ml syringe fitted with a 22-gage x 5/8" needle. Sample volume will be 1-2 ml. Blood sample will be transferred by common carrier to Co-Investigators (or other Lab as designated) for diagnostic work.

Because shortnose sturgeon have been documented in both the Thames and Housatonic Rivers in Connecticut waters by the CT DEEP, we are also requesting capturing, handling, PIT tagging and releasing up to five shortnose sturgeon annually from the Thames and Housatonic Rivers (Take table; Line 10).

Finally, we are anticipating that up to 1 adult/sub-adult and 1 juvenile life stage of Atlantic sturgeon and 1 Adult/sub-adult and 2 Juvenile life stage shortnose sturgeon, respectively, may suffer mortality or serious harm each year as a result of our proposed activities (Take table; Lines 8 & 18).

All of the above activities and plans are directly related to the Recovery Task Summary in the NMFS Final Recovery Plan for the Shortnose Sturgeon (NMFS 1998) including: 1.1B Determine abundance, age structure, and recruitment of Shortnose Sturgeon population segments; 1.2A. Conduct field research (mark-recapture, telemetry, survey sampling, etc.) to document shortnose sturgeon seasonal distribution and map concentration areas to characterize essential habitat.

An annual total of approximately 300 shortnose sturgeon in the Connecticut River is requested. An additional 5 sturgeon are requested for other rivers in Connecticut. While this is a fairly high number on an annual basis, concentrations and distribution of fish have resulted in multiple occasions of double digit catches of Shortnose Sturgeon (10-19 fish 48 times, 20-29 fish 6 times and catches of 49 and 53 in a single day) and thus a total of 300 is requested to prevent cessation of year round activities if large numbers of sturgeon are collected within a discreet place/time. More importantly, a large number of fish are requested in that while still falling below ten percent of the population, the higher the number of sturgeon tagged, the more precise the population estimate.

A similar take number is requested for Atlantic sturgeon as similar concentrations of fish have also produced 50 fish per day catches. Combined with discovery of a spawning event in the CT River, high catch numbers are requested to enhance the likelihood of collecting CT River strain sturgeon.

Supplemental Information

Status of Species:

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Shortnose sturgeon: ESA endangered throughout its range, with a CITES Appendix I designation. The stock of shortnose sturgeon in the lower portion of the Connecticut River, here described as from the mouth at river kilometer 0 to the base of the Holyoke Dam (river kilometer 140) in Holyoke MA is increasing although still at relatively low numbers. Population estimates made in 1988 ranged from 800 to 1,200 animals which increased to 1,200 to 2,200 in 2004 and then increased again to over 5,000 in 2012. Individual fish are very healthy in appearance with high condition factors that bodes well for individuals but also supports the notion of relatively low population size with no indication of density limiting effects. All available evidence of population size, collections of 'juvenile' sized fish and numerous unmarked individuals suggests that the group of sturgeon in the lower Connecticut is spawning successfully and recruiting to the population in marked contrast to reports from the above Holyoke relic stock which has experienced few successful spawning events in the last 20 years.

Atlantic Sturgeon: Fish of the New York Bight DPS and three other DPS's (Chesapeake Bay, Carolina, and South Atlantic) are listed as Endangered, while the Gulf of Maine DPS is listed as threatened as of a lack of information. Atlantic Sturgeon from all 5 DPS's have been documented in Connecticut waters. Collection of immature, genetically unique to the CT River Atlantic sturgeon documents a spawning event did occur are requires ongoing monitoring if determine if this will persist. A high number of transmitters is requested to ensure collecting data of variation in coastal movements.

**Intentional Lethal
Take:**

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No intentional lethal takes are proposed, but unintentional lethal takes have occurred on rare occasion. Over 2,500 Shortnose Sturgeon and 2,200 Atlantic Sturgeon have been collected, handled and processed by CT DEEP staff since 1988 with some individual sturgeon being captured as many as eight times. A few animals have had to be revived from gill nets when fish were extensively entangled about the head, preventing free movement of water and oxygen uptake. Since gill netting mortalities are possible, we are requesting authorization of incidental mortality of both Atlantic and shortnose sturgeon as highlighted in Take Tables.

**Anticipated Effects
on Animals:**

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***Capture:**
Capturing shortnose sturgeon in gillnets, trammel nets or trawls can result in injury and mortality, reduced fecundity, and delayed or aborted spawning migrations of sturgeon (Moser and Ross 1995, Collins et al. 2000, Moser et al. 2000; and Kahn and Mohead 2010). The negative effects of capture appear to be rare but instantaneous, such as mortality in nets or minor cuts from the nets.

Capture Incidental Mortality:
Historically, capture mortality of sturgeon was the result of long soak times (24 hours) or low dissolved oxygen, but mortality can result from those factors as well as mesh size (suffocation), water temperature, netting experience, snags, etc. Given the past experience of the researchers on this permit and multiple recaptures of many previously tagged sturgeon, we anticipate no long-term adverse effects as a result of capture during this study, though it is possible that some sturgeon could suffocate as a result of capture. Therefore, because we anticipate working at a more rigorous pace during the permit, capturing and processing up to 600 adult/subadult and juvenile shortnose and Atlantic sturgeon each year, we anticipate annual incidental mortalities.

*** Handling/Restraint:**
Routine handling and holding can result in raised levels of stress hormones in shortnose sturgeon. Shortnose sturgeon are hardy species and generally tolerant of handling; nevertheless, they are sensitive to handling stress when water temperatures are high or dissolved oxygen concentration is low or they have been held for long periods of time. Additionally, sturgeons tend to inflate their swim bladder when stressed or handled in air (Moser et al. 2000). If not returned to neutral buoyancy prior to release, they tend to float and would be susceptible to sunburn and bird attacks thus no fish will be released if they are unable to swim down and maintain their desired depth strata.

***Marking:**
Insertion of PIT and external tags may impose cumulative handling stress on sturgeon, and tag insertion sites may also rarely become infected. When PIT tags are inserted into animals having large body sizes relative to the size of the tag, empirical studies have generally demonstrated that the tags have no adverse effect on the growth, survival, reproductive success, or behavior of individual animals. However, some fish, particularly juvenile fish, could be affected if PIT tag insertion if the tag penetrates too deeply. To mitigate for these risks, no sturgeon under 300 mm will receive a PIT tag and no sturgeon will receive any external tag. As such, sturgeon may be stressed by the capture event, but no significant increase in

cortisol response is expected as a result of PIT tagging.

***Genetic tissue sampling:**

Tissue samples, clipped with sterile surgical scissors from sections of soft pelvic or anal fins of captured sturgeon, do not appear to impair the sturgeon's ability to swim and is not thought to have any long-term adverse impact (Wydoski and Emery 1983).

***Surgical Implanting Acoustic Tags:**

The surgical implantation of acoustic transmitters does have the potential to injure or kill shortnose sturgeon. In general, direct effects of the proposed tagging procedure could include pain, handling discomfort, hemorrhage at the site of incision, and risk of infection from surgery. Delayed effects could include breakage of sutures, infection, affected swimming ability, abandonment of spawning runs and/or death.

***Anesthetizing Using MS-222:**

Risks associated with anesthetizing with MS-222 would include overdosing or overexposure (caused by inexperience at recognizing the proper level of narcosis) (Coyle et al. 2004), anesthetizing fish in poor health or stressed conditions, and injury from thrashing during the excited phase of anesthetic induction.

***Anesthetizing Using Electro-narcosis:**

An alternative to MS-222 is electro-narcosis (EN) a technique described for sturgeon by Henyey et al. (2002) using non-pulsed DC voltage (0.3-0.5 V/cm, 0.01 amp). In this procedure, fish will be placed in a tank having an anode screen at one end of the tank and a cathode screen at the other end. Amperage will be minimized throughout the procedure. As voltage is applied quickly to the anode (1-2 sec), the subject fish will lose equilibrium and relax, sinking to the bottom. Voltage will then be adjusted downward until the fish becomes immobilized except for strong opercular movement. Fish will then be supported with a netting sling so only their back or ventral surface is emerged from the water before work is conducted.

***Fin Ray Samples:**

Removal of the second marginal fin ray presents little risk to sturgeon. The tissue itself is a calcified hard structure will relatively little vascularization. The technique of snipping a 1-2cm secondary ray sample from the second marginal ray of the pectoral fin is very easy to perform on animals and will result at most in minor bleeding where and if the underlying tissue containing blood vessels is the cut. The size of any such wound is likely to be small (a few mm across and 1-2cm length). Indeed, the damage to soft tissues of this sampling approach is likely more akin to that from DNA fin clipping or PIT-tagging than to that associated with removal of other hard structures (first pectoral fin spine) or surgical implantation of tags. Additionally, no anesthesia is required in the 10-second procedure. Risk is further reduced by proper securing of the fish by an assistant during fish handling and processing.

***Gastric Lavage:**

Potential injury to sturgeon could include abrasion or rupturing of the gut wall near the pyloric caecum, trauma associated with not seating the tubing properly, and potential negative growth responses of sturgeon (going off-feed) after lavaging.

***Blood Sampling:**

Risks associated with drawing blood could include pain, handling discomfort, possible hemorrhage at the site, or risk of infection. Blood sampling as described above, however, is unlikely to cause major injury or stress to individual animals. Adding this procedure to fish collected for other purposes (gastric lavage) presents little additional risk. Combining some procedures in this fashion also reduces the overall take of fish relative to the hypothetical case where these procedures are conducted independently on different individuals.

***Capture:**

If sturgeon are entangled in nets in a way not allowing the gills to move or that would require sturgeon to be held out of water for long periods, we will cut meshes to expedite their removal from the net. Further, if water quality causes sturgeon to become lethargic during sampling, for no apparent external reasons, sampling would cease as soon as possible, and any captured sturgeon would only be measured, weighed, photographed, PIT tagged, and genetic tissue sampled before being recovered and released.

**Measures to
Minimize Effects:**

***Capture Incidental Mortality:**

Several methods will be implemented to minimize mortality of sturgeon captured in gill nets and trawls. Overall net set duration as well as handling time will be reduced when water temperatures are greater than 28° C, since higher water temperatures have been found to be stressful for Atlantic and shortnose sturgeon (Moser et al. 2000 and Kahn Mohead 2010). However, periods of high temperatures and low dissolved oxygen in the past are rare in the proposed study area in Connecticut waters. Nonetheless, water quality will be monitored and sampling will not occur during periods of low dissolved oxygen or high temperatures. If sturgeon are entangled in nets and gills are occluded, we will cut meshes to expedite their removal from the net. Further, if water quality causes sturgeon to become lethargic during sampling, for no apparent external reasons, sampling will cease as soon as possible, and any currently captured sturgeon will only receive basic processing before release. Also, because we will continually monitor nets at short intervals, specimens will be removed quickly from the nets, resulting in animals less likely to experience mortality or further stress. Our close tending of nets will also reduce the risk of gear entanglement or gear loss, potentially resulting in ghost nets.

***Handling/Restraint:**

Handling stress will be minimized by minimizing holding and handling time, particularly during periods of high water temperature and low dissolved oxygen concentration. Fish will be taken from the net and placed in the live well. If fish appear to be stress by the environmental conditions, supplemental oxygen will be added to the live well with an aerator. Fish will be quickly placed into the examination box, measured, tagged and immediately released as soon as possible. Fish will not be held in the examination/tagging box for more than ten minutes and never longer than 60 minutes total.

'StressCoat' will be added to all waterbaths used while holding Shortnose Sturgeon to replace the natural slime coat that is damaged as a result of stress, capture, and handling. StressCoat serves as a water conditioner, neutralizing heavy metals and other impurities in the river water utilized and helps to prevent loss of essential electrolytes.

***PIT Tagging:**

PIT tags used for permanently marking and identifying individual captured fish are biologically inert and have been shown not to cause problems associated with some other methods of tagging fish, such as scarring and tissue damage or otherwise adversely affecting growth or survival (Brannas et al. 1994). However, since smaller juvenile sturgeon are more difficult to properly PIT tag, and thus more susceptible to mortality as a result of this procedure (Henne et al. 2008), we only plan to use 12 mm PIT tags on sturgeon above 300 mm (TL). Also we will not tag any sturgeon with external tags.

***Tagging Surgery:**

Invasive tools used during the tagging process will be sterilized with isopropyl alcohol between uses on each fish. The incision area would also be swabbed with a disinfectant prior to making the incision. After surgery, betadine will be spread over the area to deter bacteria from entering the wound. Further, surgery to implant transmitters will only be attempted when fish are in excellent condition. No sturgeon will undergo surgical intervention if the water temperature exceeds 27° C or is less than 7° C (sturgeon skin does not heal rapidly in high or low temperatures). We also follow the rule of not exceeding a combined weight of the tags greater than 2% of the fish's weight.

***Minimizing Risks from MS-222 and Electronarcosis as Anesthetics:**

To reduce risks from using MS-222, only properly trained staff would use this technique, and only non-stressed animals in good health would be anesthetized. To avoid injury while being anesthetized, sturgeon would be restrained with netting to prevent animals from jumping or falling out the anesthetic bath. Fish would be monitored closely during induction to reach the proper level of anesthesia prior to surgery, and would be observed to ensure proper recovery from anesthetic narcosis prior to release. Also, because MS-222 is an acidifying solution, potentially extending the induction time for narcosis, bath solutions would be buffered to a neutral pH with sodium bicarbonate and oxygenated prior to use.

Electronarcosis essentially removes the elements of lengthy recovery times as fish are in many cases ready for release as soon as the power is cut and of exposing fish to behavior-altering chemicals. All co-investigators using EN for the first time will be supervised by experienced personnel. Risks associated with anesthetizing with EN could include overexposure to amperage or voltage (caused by inexperience at recognizing the proper level of narcosis) (Henyey et al. 2002). All investigators are fully trained in the use of electro-narcosis to employ it

to anesthetize any sturgeon. Those new to the procedure will be fully trained by the PI or CIs until competent in the procedure.

***Gastric Lavage:**

To relax the sturgeon during gastric lavage, we will properly anesthetize animals with either light doses of MS-222 or use EN prior to the gastric lavage procedure. Due to the morphology of the gut tract and position of the swim bladder in sturgeon, we will use care to not injure sturgeon while inserting the lavage tube into the esophagus while positioning it within the gut. Only properly trained staff will use this technique, and only non-stressed animals in good health will be gastric lavaged.

***Fin Ray Sampling:**

The cuts resulting from sampling the secondary fin rays of the pectoral fin should not compromise the animal more than other minor procedures such as PIT tagging or soft ray genetic samples. The cuts would be made shallow enough so that the rigidity of the bordering rays are not compromised. The shallow wounds would be sanitized with a Povidone solution prior to returning animals the net pen or live well for recovery. Further, records of the healing rate of recaptured animals age sampled will be documented and reported in annual reports. Any inconsistent rate of healing encountered with the procedure will be reported immediately and the sampling stopped until after the permitting office has reevaluated the results.

***Blood Sampling:**

To mitigate the effects of blood sampling, the needle used to withdraw blood would be slowly advanced while applying gentle negative pressure to the syringe until blood freely flows into the syringe. Once blood is collected, direct pressure would be applied to the site to ensure clotting and prevent subsequent blood hemorrhaging (Stoskopf 1993). The site would then be disinfected and checked again after recovery prior to release. Additionally, the project staff responsible for obtaining these samples all have received extensive experience in the procedure. Drawing blood in the manner described appears to have little probability of killing shortnose or Atlantic sturgeon or producing sub-lethal effects.

***Non-targeted Bycatch:**

Other non-target species collected with gill nets or trawls in rivers and other Connecticut waters could include multiple common species to the area, including blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), white catfish (*Ameiurus catus*), and common carp (*Cyprinus carpio*). Non-target fish will be removed from the net and released at the site of capture. Due to the nature and scope of the proposed sampling, it is not anticipated that the incidental collection of any non-target fish species will negatively impact their populations in Connecticut rivers and estuaries. None of the non-target fish species that may be collected during the proposed research are currently listed under the ESA.

***Listed Sea Turtle Species:**

Listed sea turtles have been known to occur as transients in Connecticut waters within the LIS. However, the available information suggests the occurrence of sea turtles is rare. In the last six years, few sea turtle strandings have been reported (NOAA Northeast Fisheries Science Center). None of us have observed sea turtles to date, and we believe that the probability of our encountering one during our normal research activities is extremely unlikely with the measures we employ. The gear used for sampling in marine waters (small mesh gill nets (3-5 inch), each not expected to harm turtles. When using larger mesh gill/trammel nets, we will be drift fishing in the estuaries and employing continuous monitoring of nets, which would limit potential capture mortality or harm to a very minimum.

***Marine Mammals:**

Similarly, marine mammals, such as harbor seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), are rarely present in the areas sampled by our researchers. Although we do not anticipate capturing or harming a marine mammal in our research we will immediately follow all permit measures designed to avoid interaction should we encounter a marine mammal.

Resources Needed to Accomplish Objectives:

Resources including both staffing and equipment are available. We request 2 CT DEEP Co-investigators (Jacqueline Benway Roberts and Deborah Jean Pacileo) with full authorizations and abilities to conduct all activities in all CT waters. Several Research Assistants, employees of the CT DEEP will accompany CT DEEP staff when netting and taking sturgeon during the course of our activities.

Disposition of Tissues: =====

Tissue samples will be coordinated with the National Repository in Kearnsysville, West Virginia under the supervision of the archivist at the facility.

Public Availability of =====

Product/Publications: Annual reports will be produced and significant information on our results will be published in technical memorandum and through peer review journals, where appropriate.

Location/Take Information

Location

Research Area: Atlantic Ocean **State:** CT **Stream Name:** All Connecticut waters

Location Description: All Connecticut waters.

Take Information

Line	Ver	Species	Listing Unit/Stock	Production /Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
1		Sturgeon, Atlantic	New York Bight (NMFS Endangered)	Wild	Subadult/ Adult	Male and Female	130	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Mark/Recapture ATS (Adults =>1300mm FL & Sub-adults=1000-1300 mm FL in CT River); Trawls also used for capture.														
2		Sturgeon, Atlantic	New York Bight (NMFS Endangered)	Wild	Subadult/ Adult	Male and Female	25	3	Capture/Handle/Release	Net, Gill	Anesthetize; Instrument, internal (e.g., VHF, sonic); Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Telemetry ATS (Adults =>1300mm FL & Sub-adults=1000-1300 mm FL in CT River); Trawls also used for capture.														
3		Sturgeon, Atlantic	New York Bight (NMFS Endangered)	Wild	Subadult/ Adult	Male and Female	25	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Sample, fin ray clip (second ray); Weigh	N/A	6/20/2016	3/31/2027
Details: Aging ATS (Adults =>1300mm FL & Sub-adults=1000-1300 mm FL in CT River); Trawls also used for capture.														
4	A	Sturgeon, Atlantic	New York Bight (NMFS Endangered)	Wild	Juvenile	Male and Female	250	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	3/12/2019	3/31/2027
Details: Mark/Recapture Juvenile ATS (Juvenile =														
5		Sturgeon, Atlantic	New York Bight (NMFS Endangered)	Wild	Juvenile	Male and Female	10	3	Capture/Handle/Release	Net, Gill	Anesthetize; Instrument, internal (e.g., VHF, sonic); Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027

Details: Telemetry Juvenile ATS: (Juvenile =														
6		Sturgeon, Atlantic	New York Bight (NMFS Endangered)	Wild	Juvenile	Male and Female	25	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Sample, fin ray clip (second ray); Weigh	N/A	6/20/2016	3/31/2027
Details: Aging Juvenile ATS (Juvenile =														
7		Sturgeon, Atlantic	New York Bight (NMFS Endangered)	Wild	Juvenile	Male and Female	5	3	Capture/Handle/Release	Net, Gill	Anesthetize; Lavage, gastric; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Diet Study Juvenile ATS (Juvenile =														
9		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	All	Male and Female	5	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Presense -Absense Study for Shortnos Sturgeon (Adult/Sub-adult or Juvenile) in the Thames & Housatonic Rivers; Trawls also used for capture.														
10	A	Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Subadult/ Adult	Male and Female	250	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	3/12/2019	3/31/2027
Details: Mark/Recapture (Adults =>600mm FL & Sub-adults=450-600mm FL in CT River); Trawls also used for capture.														
11		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Subadult/ Adult	Male and Female	25	3	Capture/Handle/Release	Net, Gill	Anesthetize; Instrument, internal (e.g., VHF, sonic); Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Telemetry Study (Adults =>600mm FL & Sub-adults=450-600mm FL in CT River); Trawls also used for capture.														
12		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Subadult/ Adult	Male and Female	25	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Sample, fin ray clip (second ray); Weigh	N/A	6/20/2016	3/31/2027
Details: Aging Study (Adults =>600mm FL & Sub-adults=450-600mm FL in CT River) Trawls also used for capture.														
13		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Subadult/ Adult	Male and Female	20	3	Capture/Handle/Release	Net, Gill	Anesthetize; Lavage, gastric; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Diet Study (Adults =>600mm FL & Sub-adults=450-600mm FL in CT River); Trawls also used for capture.														

14		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Juvenile	Male and Female	50	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Mark/Recapture (Juvenile =														
15		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Juvenile	Male and Female	10	3	Capture/Handle/Release	Net, Gill	Anesthetize; Instrument, internal (e.g., VHF, sonic); Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Telemetry (Juvenile =														
16		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Juvenile	Male and Female	25	3	Capture/Handle/Release	Net, Gill	Mark, PIT tag; Measure; Photograph/Video; Sample, fin clip (genetic); Sample, fin ray clip (second ray); Weigh	N/A	6/20/2016	3/31/2027
Details: Aging (Juvenile =														
17		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Juvenile	Male and Female	15	3	Capture/Handle/Release	Net, Gill	Anesthetize; Lavage, gastric; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, fin clip (genetic); Weigh	N/A	6/20/2016	3/31/2027
Details: Diet Study (Juvenile =														
19		Sturgeon, Atlantic	Range-wide (NMFS Endangered/Threatened)	Wild	Subadult/Adult	Male and Female	1	1	Unintentional mortality	Net, Gill	Unintentional mortality	N/A	6/20/2016	3/31/2027
Details: Incidental mortality ATS Adult/subadult (Note: Must contact Permitting Office within 2 days)														
20		Sturgeon, Atlantic	Range-wide (NMFS Endangered/Threatened)	Wild	Juvenile	Male and Female	1	1	Unintentional mortality	Net, Gill	Unintentional mortality	N/A	6/20/2016	3/31/2027
Details: Incidental mortality ATS Juvenile (Note: Must contact Permitting Office within 2 days)														
21		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Subadult/Adult	Male and Female	1	1	Unintentional mortality	Net, Gill	Unintentional mortality	N/A	6/20/2016	3/31/2027
Details: Incidental mortality SNS Adult/subadult (Note: Must contact Permitting Office within 2 days)														
22		Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Juvenile	Male and Female	1	1	Unintentional mortality	Net, Gill	Unintentional mortality	N/A	6/20/2016	3/31/2027
Details: Incidental mortality SNS Juvenile (Note: Must contact Permitting Office within 2 days)														
23	A	Sturgeon, shortnose	Range-wide (NMFS Endangered)	Wild	Egg/Larvae	Unknown	300	1	Intentional (Directed) Mortality	Egg mat	Collect eggs (wild)	N/A	3/12/2019	3/31/2027
Details: Documenting spawning occurrence & periodicity														

NEPA Checklist

1) If your activities will involve equipment (e.g., scientific instruments) or techniques that are new, untested, or otherwise have unknown or uncertain impacts on the biological or physical environment, please discuss the degree to which they are likely to be adopted by others for similar activities or applied more broadly.

No equipment utilized or techniques employed are novel or new. The PI has experience with both Shortnose and Atlantic Sturgeon that dates back to 1988 and had had several previous Endangered Species Permits.

2) If your activities involve collecting, handling, or transporting potentially infectious agents or pathogens (e.g., biological specimens such as live animals or blood), or using or transporting hazardous substances (e.g., toxic chemicals), provide a description of the protocols you will use to ensure public health and human safety are not adversely affected, such as by spread of zoonotic diseases or contamination of food or water supplies.

No collecting, handling or transporting of infectious agents or pathogens are anticipated. Hazardous materials handled will be limited to reagent grade alcohol for tissue samples, 'StressCoat' for electrolyte/mucous coat restorative, and MS222 anesthetic will all be handled safely as per CT DEEP Hazardous Materials Protocols.

3) Describe the physical characteristics of your project location, including whether you will be working in or near unique geographic areas such as state or National Marine Sanctuaries, Marine Protected Areas, Parks or Wilderness Areas, Wildlife Refuges, Wild and Scenic Rivers, designated Critical Habitat for endangered or threatened species, Essential Fish Habitat, etc. Discuss how your activities could impact the physical environment, such as by direct alteration of substrate during use of bottom trawls, setting nets, anchoring vessels or buoys, erecting blinds or other structures, or ingress and egress of researchers, and measures you will take to minimize these impacts.

We do not anticipate any negative impacts from our activities. We will not be operating in national Marine Sanctuaries or Marine Protected Areas, Parks or Wilderness Areas. Bottom trawling is conducted with small, low horsepower boats, nets set and tended by hand so no negative trawl footprint is expected.

4) Briefly describe important scientific, cultural, or historic resources (e.g., archeological resources, animals used for subsistence, sites listed in or eligible for listing in the National Register of Historic Places) in your project area and discuss measures you will take to ensure your work does not cause loss or destruction of such resources. If your activity will target marine mammals in Alaska or Washington, discuss measures you will take to ensure your project does not adversely affect the availability (e.g., distribution, abundance) or suitability (e.g., food safety) of these animals for subsistence uses.

We do not anticipate any negative impacts on any scientific, cultural or historic resources.

5) Discuss whether your project involves activities known or suspected of introducing or spreading invasive species, intentionally or not, (e.g., transporting animals or tissues, discharging ballast water, use of equipment at multiple sites). Describe measures you would take to prevent the possible introduction or spread of non-indigenous or invasive species, including plants, animals, microbes, or other biological agents.

We would not un-intentionally transport any materials between waterbodies and or areas. Boat trailers are examined and cleaned at each boat launch and boats are rinsed and drained before leaving the launch site as it is against State Law and CT Department of Energy and Environmental Protection Department policy to transport invasive species.

Project Contacts

Primary Contact: Tom F. Savoy

Principal Investigator: Tom F. Savoy

Other Personnel	
Name	Role(s)

Deborah Pacileo	Co-Investigator
Jaqueline Benway Roberts	Co-Investigator

Attachments

- Application Archive - (Added Apr 3, 2017)
- Certification of Identity - (Added Jul 26, 2016)
- Contact - Deborah Pacileo (Added Jul 26, 2016)
- Contact - Jaqueline Benway Roberts (Added Jul 26, 2016)
- Contact - Tom F. Savoy (Added Jun 20, 2016)
- Project Description - (Added May 28, 2015)
- Resources Needed - (Added Jun 20, 2016)

Status

Application Status:	Application Complete
Date Submitted:	June 20, 2016
Date Completed:	January 12, 2017
FR Notice of Receipt Published:	January 18, 2017 Number: 2017-00956
Comment Period Closed:	February 17, 2017 Comments Received: No Comments Addressed: No
Last Date Archived:	May 6, 2019

- ESA Section 10(a)(1)(A) permit (other)
 - Current Status: Issued Status Date: March 31, 2017
 - Section 7 Consultation: Programmatic
 - NEPA Analysis: Categorical Exclusion
 - Date Cleared by General Counsel: March 23, 2017
 - FR Notice of Issuance/Denial Published: April 6, 2017 Notice Number: 2017-07000
 - Expire Date: March 31, 2027

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Modification Requests

Modifications Requested

Number	Title	Description	Status	Date Submitted	Date Issued	Issued Version
1	CT DEEP Permit Modification Request	<p>We request three modifications to our existing Permit to achieve the following objectives: that the number of juvenile Atlantic Sturgeon in the Capture/Handle/Release category (Line 4) be increased to 250 to better reflect recent catch levels in Connecticut water, to allow the development of an index of relative abundance and or estimate population size; the number of adult Shortnose Sturgeon in the Capture/Handle/Release category be increased to 250 adult (Line 11) to increase the precision of the population estimate; and a Permitted take of 500 Shortnose Sturgeon eggs (Line 21) be added to document presence or absence of contemporary spawning at specific locations south of the Holyoke Dam (the lower Connecticut River).</p> <p>Description:</p> <p>(1) Atlantic Sturgeon Juveniles (Capture/Handle/Release): We are requesting increased take for Atlantic sturgeon juvenile life stages in the lower Connecticut River and Long Island Sound. The reason for the increase in numbers of juvenile Atlantic Sturgeon to Capture/ Handle/Release category is that evidence collected in recent years documents high abundance of Atlantic Sturgeon in the lower Connecticut River and nearby in Long Island Sound. Catches in excess of 25 Atlantic Sturgeon per day have occurred more than 20 times in recent years with several incidents of more than 50 sturgeon per day. Two sampling efforts in early October 2017 resulted in the collection of 52 and then 74 juvenile Atlantic Sturgeon, respectively, with no recaptures of fish from the previous week. A total of 125 juvenile Atlantic Sturgeon were collected in October of 2017 from a 6 kilometer reach of the lower Connecticut River suggesting that local abundance of sturgeon was pretty high given the numbers seen in passive gillnets. Methods and materials employed to collect Atlantic Sturgeon will remain unchanged. One to four 100.0 m gill nets in a variety of stretched mesh sizes (7.6 – 30.5 cm stretched mesh) will be anchored in selected areas for one to three hours. The actual soak time will be dependent upon water temperature and dissolved oxygen levels as per Sturgeon Protocols (Kahn and Mohead 2010). Skiff trawls will continue to be employed in those locations where and when conditions (boat traffic, flow rates and other environmental conditions) permit. Evidence of increased local abundance and recent documented spawning (Savoy et al 2016) supports the increase in Take that will allow for improved quantitative assessment of Atlantic Sturgeon in Connecticut waters.</p> <p>(2) Shortnose Sturgeon Adult/Subadult (Capture/Handle/Release): We are requesting increased take for shortnose sturgeon adult and sub-adult life stages in the lower Connecticut River. Increased Permitted Take of adult and subadult Shortnose Sturgeon in the Capture/Handle/Release category is based on several distinct reasons. We have documented increased abundance of Shortnose Sturgeon in the lower Connecticut River from 1988 to 2002 (Savoy 2004), and believe the population has continued to increase into the 8,000 adult fish range (CT DEEP unpublished). This increase in abundance provides indirect proof of successful spawning and recruitment in the lower river. A secondary, but no less important rationale, is that we are asking for an increase in take in the Capture/Handle/Release category, which is the least invasive process and we have a long history of successful capture and tagging without apparent harm. As documented in annual reports (1990-2017, CT DEEP unpublished), over 2,700 Shortnose Sturgeon have been captured and tagged. More than 600 of the sturgeon collected were recaptures of previously tagged fish. Most sturgeon collected had high condition factors documenting abundant forage and good growing conditions. Many recaptured Shortnose Sturgeon have been collected and handled numerous times; some individuals as many as nine times over the years since sturgeon research began in Connecticut. Recaptured sturgeon also document longevity, with time between initial and subsequent captures extending to 25 years. Seventy recaptures had times between handling events greater than 10 years and these are more compelling when it is noted that most were already full adults when first tagged suggesting minimum ages of 30 to 50. A manuscript in development will characterize the increases seen in length and weight from these recaptures Shortnose Sturgeon. Lastly, NMFS GARFO issued a Biological Opinion (Bi Op) on Shortnose Sturgeon for the continued operation</p>	Issued	08/01/2018	03/12/2019	

		<p>of the hydroelectric facility at the Holyoke Dam in Holyoke MA which allows annual lifting of up to 840 Shortnose Sturgeon. Since it is possible that upstream and downstream passage of sturgeon over the Holyoke Dam could cause significant stress and mortalities could result, this policy change for sturgeon passage at Holyoke creates a distinct need for enhanced and ongoing monitoring of the Shortnose Sturgeon population in the Connecticut River below the Holyoke Dam as well as those above. Without continued and increased monitoring and collection in the lower river, it will not be possible to evaluate downstream mortality and the overall effect of this policy on the stock of Shortnose Sturgeon in the lower CT River and its continued persistence. Methods and materials employed to collect Shortnose Sturgeon will remain unchanged. Skiff trawls will continue to be employed in those locations and when conditions (boat traffic, flow rates and other environmental conditions) permit. Trawling has been proven to be highly effective in Connecticut with high numbers of sturgeon collected in single 8 to 12 minute tows, large numbers of sturgeon per day from small geographic areas and high numbers per month with few recaptured sturgeon document high utilization of these select area. From one to four 100.0 m gill nets in variety of stretched mesh sizes (7.6 – 20.4 cm stretched mesh) will be anchored in those areas where trawling is not possible (obstructions, erratic depth contours and known hangs) for one to three hours. Actual soak time will be dependent upon water temperature and dissolved oxygen levels as per Sturgeon Protocols (Kahn and Mohead (2010).</p> <p>(3) Shortnose Sturgeon (Early Life Stage Study): We are requesting take for shortnose sturgeon early life stages in the lower Connecticut River. Permitted Take of 500 Shortnose Sturgeon Eggs & Larvae by Connecticut DEEP Fisheries Division is requested to document the location of contemporary Shortnose sturgeon spawning areas in the lower Connecticut River through the collection of spawned fertilized eggs. Egg mats (Marchant and Shutters 1996, Fox et al. 2000) will be deployed at two locations, both the previously described Holyoke, MA location (Buckley and Kynard 1983) and a second possible spawning location further South in the Windsor, CT area. Vemco Positioning System (VPS) acoustic arrays will be deployed in both locations during the spawning season to record the presence of transmitted spawning Shortnose Sturgeon. Detection data will be forwarded to Vemco after the 2019 spawning season (and each subsequent season) for processing to precisely locate all transmitters (fish) detected within the spawning areas. Precise location data will then be utilized to better define preferred spawning habitats, including depth and substrate. Egg mats will be fished from April 15 through May 15, from 2019-2022 if environmental conditions permit. River flow rates above 40,000 cfs prevent safe launching of boats in these areas that are necessary to conduct this sampling. Egg mats will be deployed with 2 to 4 individual red circular polyester floor-buffing pads, 60.9 cm diameter pads per set, 10 to 15 sets per location. Egg mat sets will be weighted and attached to an anchor with nylon rope and have a surface float for retrieval. Pads will be checked every 24 to 72 hours. A subsample of eggs will be retained for staging of eggs to determine age and back calculate approximate spawning times. A portion of these samples will be archived for future analyses of genetic material. Confirmation of contemporary spawning in the lower CT River is vital to a comprehensive analysis of stock status.</p>				
2	Life history of CT Shortnose and Atlantic Sturgeon	Add Robert Michelson to permit for the purpose of collecting photographs and video images of Shortnose and Atlantic sturgeon while accompanied by one of the principal investigators on Permit 19641 (Savoy, Pacileo, Benway-Roberts). Photos and video will be used for educational and outreach activities of the Connecticut Department of Energy and Environmental Protection.	Issued	04/26/2019	05/03/2019	

Reports

Reports Required						
Nbr	Report Type	Report Period		Date Due	Status	Date Received
		Start Date	End Date			
1	Annual	04/01/2017	12/31/2017	02/01/2018	Submitted	02/13/2018

2	Annual	01/01/2018	12/31/2018	02/01/2019	Submitted	02/01/2019
3	Annual	01/01/2019	12/31/2019	02/01/2020	N/A	
4	Annual	01/01/2020	12/31/2020	02/01/2021	N/A	
5	Annual	01/01/2021	12/31/2021	02/01/2022	N/A	
6	Annual	01/01/2022	12/31/2022	02/01/2023	N/A	
7	Annual	01/01/2023	12/31/2023	02/01/2024	N/A	
8	Annual	01/01/2024	12/31/2024	02/01/2025	N/A	
9	Annual	01/01/2025	12/31/2025	02/01/2026	N/A	
10	Combined Annual/Final	01/01/2026	03/31/2027	05/01/2027	N/A	